

ABSTRACT OF THE DISCLOSURE

A method is provided for forming a metal-containing film on a substrate by a sequential gas exposure process in a batch type processing system. A metal-containing film can be formed on a substrate by providing a substrate in a process chamber of a batch type processing system, heating the substrate, sequentially flowing a pulse of a metal-containing precursor gas and a pulse of a reactant gas in the process chamber, and repeating the flowing processes until a metal-containing film with desired film properties is formed on the substrate. The method can form a metal-oxide film, for example HfO_2 and ZrO_2 , a metal-oxynitride film, for example $\text{Hf}_x\text{O}_2\text{N}_w$ and $\text{Hf}_x\text{O}_2\text{N}_w$, a metal-silicate film, for example $\text{Hf}_x\text{Si}_y\text{O}_z$ and $\text{Zr}_x\text{Si}_y\text{O}_z$, and a nitrogen-containing metal-silicate film, for example $\text{Hf}_x\text{Si}_y\text{O}_z\text{N}_w$ and $\text{Zr}_x\text{Si}_y\text{O}_z\text{N}_w$. A processing tool containing a batch type processing system for forming a metal-containing film by a sequential gas exposure process is provided.